

The Sagging Line Mitigator (SLiM)

Overview

In today's energy market, electric power transmission and distribution lines often get pushed to their limits while the power industry continues to face delays in installing new facilities. Thermal limitations arise when the maximum allowable conductor sag is attained. Subsequently, this problem was addressed by expensive transmission and distribution line construction or reconductoring.

However, thanks to Material Integrity Solutions with the sponsorship of the California Energy Commission, the Sagging Line Mitigator (SLiM) was developed and demonstrated to solve this problem. During the research, development and demonstration process, SLiM achieved all of its project objectives and has proven that it can be manufactured and built to the utility industry specifications. The relatively inexpensive in-line device reacts to increasing conductor temperature by decreasing the effective length of the conductor in the span, mitigating the natural thermal expansion experienced

by the conductor during high-temperature operation. This can represent a multi-fold increase of rated line capacity. The device is completely passive and requires practically no maintenance.



The Sagging Line Mitigator (SLiM).

SLiM is rugged and strong, simple to install, and designed to have a very long life.

Possible Applications

A system contingency situation (one or more lines out) increases line loading on nearby lines, causing some of them to exceed their thermal limits – usually established to maintain conductor-to-ground clearances. The action of SLiM, which mitigates the excess sag caused by

high temperature operation, can allow for safe line and system operation during the contingency situation since line capacity is increased by allowing operation beyond conventional thermal limits. This eliminates the need for costly line modification projects.

Many older lines were constructed to 120°F maximum conductor temperature operation. Studies have shown that SLiM enables operation of such lines at a conductor temperature exceeding 200°F without compromise of line clearances or tensions. This can represent a multi-fold increase of rated line capacity.

System planning projects that certain lines will become overloaded as a result of local load growth. In this instance SLiM can delay the need for either a new line or considerable line modifications while the anticipated load materializes.

(Cont.)



Line routing or line modifications near airports quite often require structures to be as low-profile as possible. SLiM can be employed in a cost effective fashion to minimize line height for such installations while maintaining required ground clearances.

Costly Alternatives To SLiM

Conventional solutions to the problem presented by line operating conditions that cause excessive sagging include:

- Replacement of the existing conductor with a premium conductor that can operate at high temperatures without excess sag.



SLiM sag reduction test in progress.

- Reinforcement of line structures and foundations for increased mechanical loading and either reconductor with a larger conductor or bundle with the existing size conductor.

- Raising of towers at key line locations to provide for increased ground clearance (may require foundation reinforcement).

- Addition of intermediate towers at key line locations to increase ground clearances.



SLiM installed and working.

These alternatives are all more costly solutions than SLiM!

SLiM has attracted the interest of several utilities and the Electric Power Research Institute (EPRI). With positive test results and the assistance of the California Energy Commission, SLiM is a great example of an innovative concept and its practical application to energy reliability.

**For More
Information Contact:**

**Laurie ten Hope • California Energy Commission
1516 9th Street • Sacramento, CA 95814
(916) 654-5045**

www.energy.ca.gov/pier